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ABSTRACT

A sample of 234 fifth- and 259 sixth-grade students scaled the items of the Piers-Harris, Tennessee, Coopersmith, and Lipsett self-concept measures. The scaling of the Piers-Harris and the Tennessee inventories was examined in reference to their subscales. The present technique placed items on a bivariate plane of two orthogonal dimensions (Love/Hate and Dominance/Submission). The technique evidenced little discriminant ability among the subscales of either measure. The results suggest that subscales do not reflect separate components of self-concept. The use of these measures may provide an assessment of the self-concept; but the subscales connot be interpreted as empirical support for the currently accepted idea that self-concept factors have been accurately identified through the analysis of these measures. Attempts were made to suggest an alternative method for the analysis of the individual items and demonstrate a technique useful during the construction of self-concept measures. (Author/DWH)

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Evaluation of the Construction of the Subscales for the Piers-Harris and Tennessee Inventories

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by

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Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, Illinois, April, 1985

TM 850358

ABSTRACT

A sample of 234 fifth- and 259 sixth-grade students scaled the items of the Piers-Harris, Tennessee, Coopersmith, and Lipsett self-concept measures. The scaling of the Piers-Harris and the Tennessee was examined in reference to their subscales. The present technique placed items on a bivariate plane of two orthogonal dimensions (Love/Hate and Dominance/Submission). The technique evidenced little discriminant ability among the subscales of either measure. The results suggest that subscales do not reflect separate components of self concept. The use of these measures may provide an assessment of the self concept; but the subscales cannot be interpreted as empirical support for the currently accepted idea, that self concept factors have been accurately identified through the analysis of these measures. Attempts were made to suggest an alternative method for the analysis of the individual items and, hopefully, demonstrate a technique useful during the construction of self concept measures.

The instruments currently in use for measuring self concept have been criticized as poorly developed and unsubstantiated by empirical methodology. Numerous studies detail methodological problems, which range from lack of verified referents to low correlations among the measures themselves (Wylie, 1974; Shavelson, 1974). Other studies focus on the necessity of establishing a specific definition of self concept and the components comprising it (Marx & Winne, 1978; Shavelson, 1976). Most theoretical perspectives of self concept see the construct as multidimensional and, thereby; develop instruments divided into specific subareas. In many instances, a factor analytic approach is utilized to confirm the areas hypothesized by the theory's nomological network. The rationale is that the factors produced should resemble the hypothesized omponents and are taken as support for them. Many studies appear in the literature using a factor analytic approach suggesting confirmation of self concept as a multidimensional construct (Wylie, 1974; 1979; Shavelson, 1976). The studies do not resolve the inconsistencies among the measures. Wylie (1974) states that cross instrument correlations range from .00 to +.81. The typical r is +.40 in many of the instruments examined. If assessment of the self concept were truly discerned by the instruments, one would expect them to correlate highly. Several self concept measures contain subscales; yet among the measures, these subscales do not often correspond to one another. These measures may have similarly named subscales which in analysis differentiate themselves from one another. There are also several instruments which have similarly developed different subscales and emphasize their scales as central to defining self concept.

Another type of analysis, Multitrait-Multimethod (MTMM), has also been utilized in self concept research to address the issues of multidimensionality and similarity among measures. The technique examines both convergent and divergent validity of similar traits assessed in different ways. Many self concept measures differ in the manner of assessing the attribute and, thus; raise the issue of whether similarly "named" instruments really measure a similar trait. Self ratings, peer ratings, and teacher ratings represent subtle differences in defining self concept. Summary scores negate the purpose of subscales, and the use of idiosyncratic instruments confound the attempts to establish reliability and validity. Marx and Winne (1978) and Shavelson (1982)

found little evidence for the divergence of subscales within their self concept research. Marsh and Smith (1982) examined the dimensionality of the Sears and Coopersmith inventories. Their concern centered on examining factor analyses of the instruments, as well as Multitrait-Multimethod analyses. Some of their conclusions reiterate the findings of previous studies and suggest a need for a technique capable of establishing an empirical network among self concept items. The network would need to be derived from the meaning of the items themselves. The interpretation of the items would be in reference to the interpersonal traits and behaviors they are seen as representing in relation to self concept.

The present study uses an alternative approach to examine self concept measures. It is considered to be a direct scaling method. Subjects do not use the items to describe themselves; rather, they place the items in reference to two dimensions. This is accomplished by using a 9-point bipolar continuum anchored by Love/Hate for the first scaling of the items and Dominance/Submission for the second scaling of the items. Prior studies indicate the dimensions are orthogonal (Rinn, 1965). The results of the scaling form a bivariate pair which allows for item placement on a plane created by the orthogonal axes.

The circular structure was developed by Guttman (1954), where he hypothesized a circular model for variables. Guttman (1957) later confirmed a circular order among Thurstone's tests of mental abilities using patterned intercorrelation matrices. Other studies confirmed the use of a circular model (Leary, 1956; Schaefer, 1961; Slater, 1962; Russell, 1979) for their variables utilizing the bivariate scaling method. A scaling procedure used by Woodworth and Schlossberg (1954) resulted in confirmation of the circular order when applying the bivariate scaling method. The dimensions confirmed by Rinn (1965) as orthogonal were Love/Hate and Dominance/Submission. The scaling procedure, the dimensions, and statistical analysis used by Ross (1938) were successfully applied by McCormick (1981) to the items of the Leary Interpersonal Checklist. These results demonstrate the use of such a scaling technique for attribute measures (i.e. self concept).

> The scaling of personality items has frequently been recommended (Guilford, 1954). . . . involves a differenct type of order, an order of kind rather than one of degree. . . .differences of kind have generally been approached as classification problems (nominal scaling) in Stevens' (1951) scheme. The scores from most personality inventories

are arranged as profiles of arbitrarily ordered nonoverlapping variables in what Cooley (1971) has called the "parallel-stalk model". Guttman's circumplex model makes the assumption that at least some psychological variables can be ordered along some latent metathetic continuum (McCormick, 1981).

The link between circular scaling of the Leary Interpersonal Checklist and self concept measures is found in the interpersonal behaviors and traits contained in the instruments. The bivariate scaling method appeared appropriate for application to self concept measures with suggestions following the McCormick study. Many of the suggestions in that study were construction improvements with an attempt to advocate the direct scaling of items. This direct scaling would improve the current technique of obtaining expert judgment, which may be subjectively narrow in focus. The results of the direct scaling would also be useful in creating subscales. The subscales created in this fashion would be viewed as empirically derived through the use of a large number of subjects who judge the items in regard to meaning.

METHOD

Subjects

The total sample consisted of 234 fifth- and 259 sixth-grade students (256 females and 237 males). The sample was selected from suburban schools adjacent to metropolitan Chicago and was predominately white and middle class.

Instrumentation

Four inventories (Tennessee, Piers-Harris, Coopersmith, and Lipsett) were combined into a single scale. A pilot study revealed the scale was too lengthy, and two forms were constructed (items of the Coopersmith, Piers-Harris, and Lipsett appeared on one; and items of the Tennessee, Coopersmith, and Lipsett appeared on the other scale). The number of subjects providing information in regard to the scaling of the items was: Tennessee: 116 females and 116 males; Piers-Harris: 140 females and 121 males; Lipsett: 256 females and 237 males; Coopersmith: 256 females and 237 males.

Administrative Procedures

The administration of the scales consisted of making the scaling task explicit to the children. Verbal examples were presented to the children prior to their use of the scales. The continuum end labels (Love/Hate and Dominance/Submission) as well as the modifiers (strongly, moderately, mildly, neutral) were carefully explained to the children. The Love/Hate dimension was administered during the first session, and the Dominance/Submission dimension was given during the second session. A 3-inch by 11-inch guide was available for each subject to assest in the correct placement of choices. The continuum was a 9-point Likert scale (categories ranging from +4 to -4 with zero designated as neutral). On the administration of the Dominance/Submission dimension, the guide had the labels defined for easy reference by the subjects.

Statistical Analysis

To prepare the data for analysis, the instruments were separated into their separate scales. The Piers-Harris and the Tennessee were chosen for this study as there was a general consensus in the literature that the two instruments contained separate subscales. Such subscales were not readily available for the Coopersmith and the Lipsett.

The following steps were used:

1. The mean rating for each item was calculated for both dimensions using the 1979 edition of SAS. These means placed the items into the bivariate plane, where Love/Hate corresponded to the vertical axis. (0^{o} to 180^{o} constituted the two anchors for the Love/Hate dimension, and 90^{o} to 270^{o} constituted the two anchors for the Dominance/Submission dimension.) The angle calculation for each item placement was performed using the formula:

$$\theta = \tan^{-1}(y/x)$$

2. Vector lengths were determined from the angles. The sine and cosine were used as coordinates on the unit circle to which the data were normalized (McCormick, 1981). A resultant vector could then be computed for combinations of items (i.e. subscales). The formulas (Batschelet, 1981) were:

$$\theta \arctan = \frac{\sin \theta}{\cos \theta} \qquad \text{length } r = (\cos)^2 + (\sin)^2$$

3. The correlations among the subscales are examined through use of the following procedure: θ_1 (angular value of subscale 1) minus θ_2 (angular value of subscale 2) followed by the determination of the cosine of this angular difference (Batschelet, 1981).

Results

Tables I and II list the correlations among the subscales of the Piers-Harris and the Tennessee Inventories. Subscales correlating above +.90 are designated with an asterisk. It is emphasized that these subscales are presented as components of self concept. They are to be regarded as separate entities (postulated by the authors or derived by factor analysis). The number of subscales correlating so highly suggests they measure the same aspect of self concept rather than separate aspects.

INSERT TABLES I AND II HERE

Table III presents a summary of two factor analyses of the Tennessee Inventory. The manual did not provide a factor analysis of the items, and the two studies (Gable, 1973; Vacchiano, 1968) are examples of attempts to confirm the subscales. The studies confirm criticisms that scales derived by factor analysis often shift items among the scales. This is seen as resulting from the reliance on expert judgment which may be too narrow a focus as well as too small a sample in determining the meaning of the items. These factor analyses also differ in their choice of solution and further complicate the interpretation of the factors (subscales) they are attempting to confirm or derive. The solutions (orthogonal and oblique) do not clarify the structure of the subscales and suggest analysis in this manner is not helpful in constructing separate subscales.

INSERT TABLE III HERE

Discussion

The examination of the factor analyses of the Tennessee and Piers-Harris provide little direct confirmation of their subscales. Low factor loadings (.40) and placement of items on two factors support an "overlapping of factors" perspective. As previously mentioned, the shifting of items in factor analytic studies has been observed and seen as a disadvantage accruing to the technique itself. Although a matter of arbitrary convention (Gorsuch, 1974) low factor loadings indicate the selection of items may not be the best measure of the hypothesized components of the attribute (i.e. self concept) under study. The subscales, if defined as separate components, also demonstrate too high a degree of redundancy and cannot be taken as accurately identified for self concept. These results are consistent with previous research (Shavelson, 1976; Marsh, 1982) and offer some support for the advocation of direct scaling of the items. The direct scaling would provide more information in reference to the meaning of the items. Hopefully, this additional information could aid construction of accurate and separate subscales.

McCormick (1981) also suggests that the vector lengths may represent some measure of agreement which indicates a degree of intensity for the items. Summary score methods could be compared to the use of the vector lengths as "weights" to compute scale scores. The additional information would be useful in the interpretation of a subject's score.

The results confirm the use of the circular scaling technique as seen in the McCormick study. The major suggestion drawn from the two studies is that circular organization may be useful in determining the structure of measures directed toward examining interpersonal traits and behaviors. Future research would hopefully demonstrate that item ambiguity could be minimized by constructing scales from items clustering within a certain degree range (McCormick, 1981). The discrimination smong these items would allow the development of separate subscales without the redundancy that factor analytic approaches currently provide when the items shift from factor to factor. This direct scaling method would not be affected in this fashion, and ambiguous items could be identified and removed from the analysis. These inventories should

now be examined with the idea of creating subscales. The subscales could be tested as to their representativeness in regard to designating separate aspects of the self concept.

TABLE I

Correlations Among Subscales of the Piers-Harris Inventory
(Females Above Diagonal -- Males Below Diagonal)

Scale	I	II	III	IV	V	VI
I		-.282	-.487	.996*	.640	.887
II	-.707		.975*	-.202	.555	.190
III	-.769	.995*		-.413	.357	-.031
IV	.996*	.647	-.714		.702	.922*
V	-.647	.996*	.984*	-.582		.922*
VI	.845	.222	-.310	-.886	-.141	

TABLE II

Correlations Among Subscales of the Tennessee Inventory
(Females Above Diagonal -- Males Below Diagonal)

Scale	I	II	III	IV	V	VI	VII	VIII	IX
I		-.165	.140	.272	.188	.775	-.148	.542	.014
II	-.404		.953*	.903*	.936*	.493	.999*	.738	.983*
III	-.072	.941*		.990*	.998*	.733	.958*	.907*	.992*
IV	-.013	.919*	.998*		.996*	.818	.910*	.956*	.954*
V	.210	.808	.959*	.974*		.766	.943*	.972*	.984*
VI	.723	.338	.636	.680	.827		.509	.950*	.641
VII	-.399	.999*	.943*	.922*	.812	.344		.750	.986*
VIII	.514	.575	.817	.850	.946*	.964*	.580		.847
IX	.119	.859	.981	.991*	.995*	.772	.862	.912*	

TABLE III

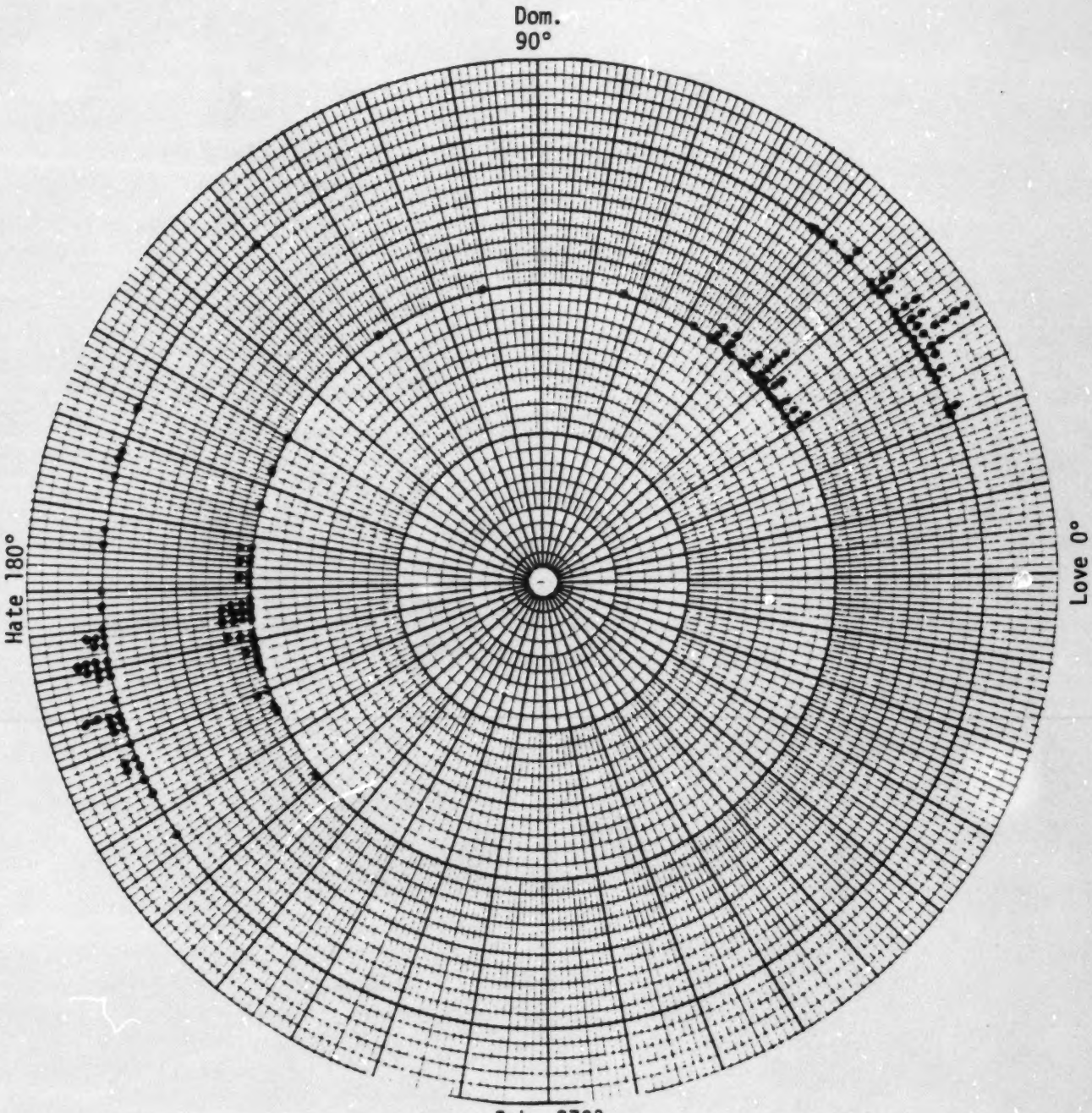
Number of Items < .40 on Each Inventory

Tennessee Inventory

Scale	Gable Study (Oblique)	Vacchiano Study (Orthogonal)
Identity	8	3
Self Satisfaction	12	8
Behavior	13	6
Physical	5	2
Moral-Ethical	10	3
Personal Self	5	3
Family Self	7	1
Social Self	5	7
Self-Criticism	4	2
Total	69	35

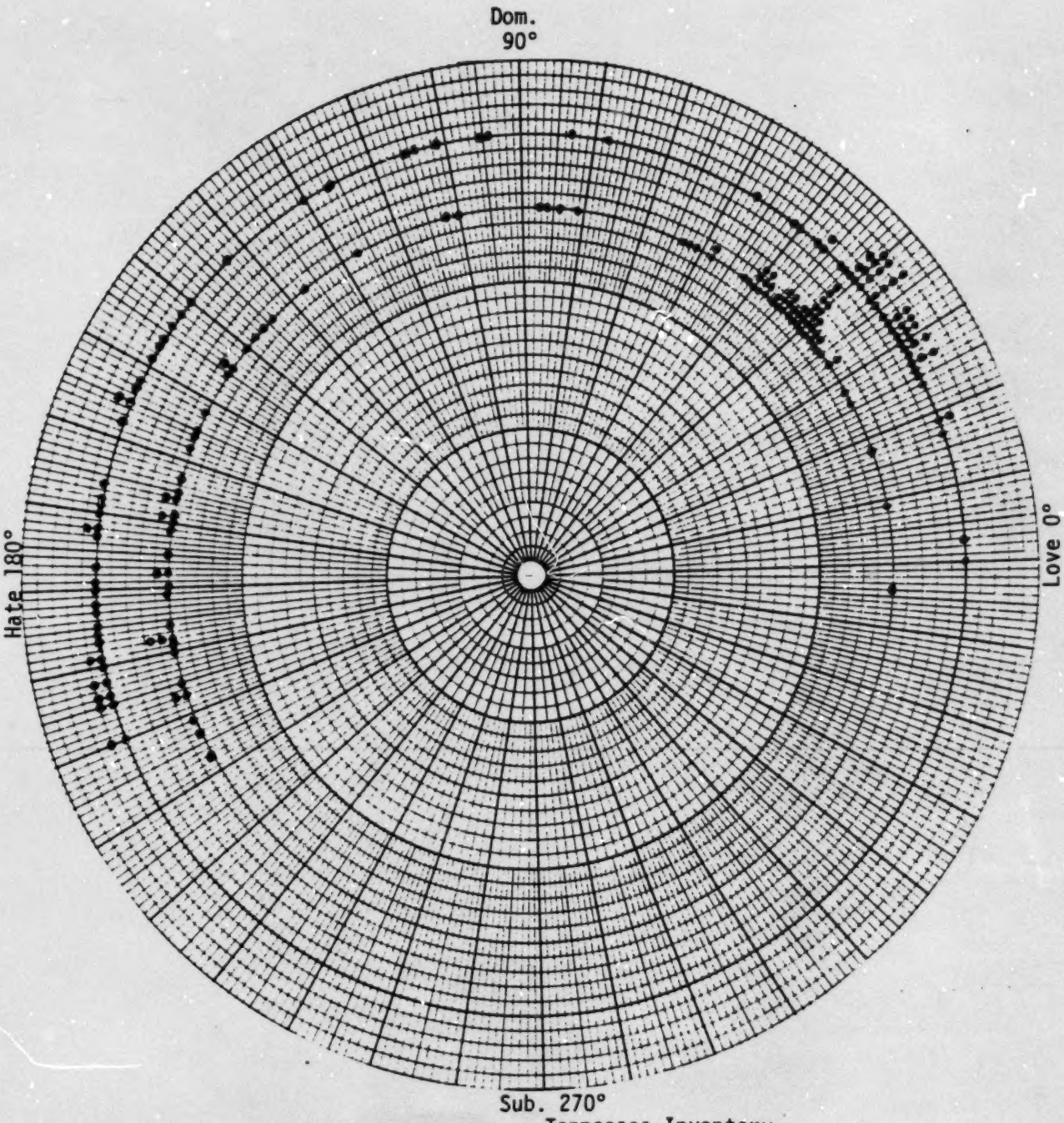
Piers-Harris Inventory

Scale	Items < .40	Items listed on two or more scales
Behavior	6	1
Intell. & School Status	8	7
Physical Appearance	6	5
Anxiety	6	3
Popularity	6	4
Happiness & Satisfaction	4	2
Total	36	22



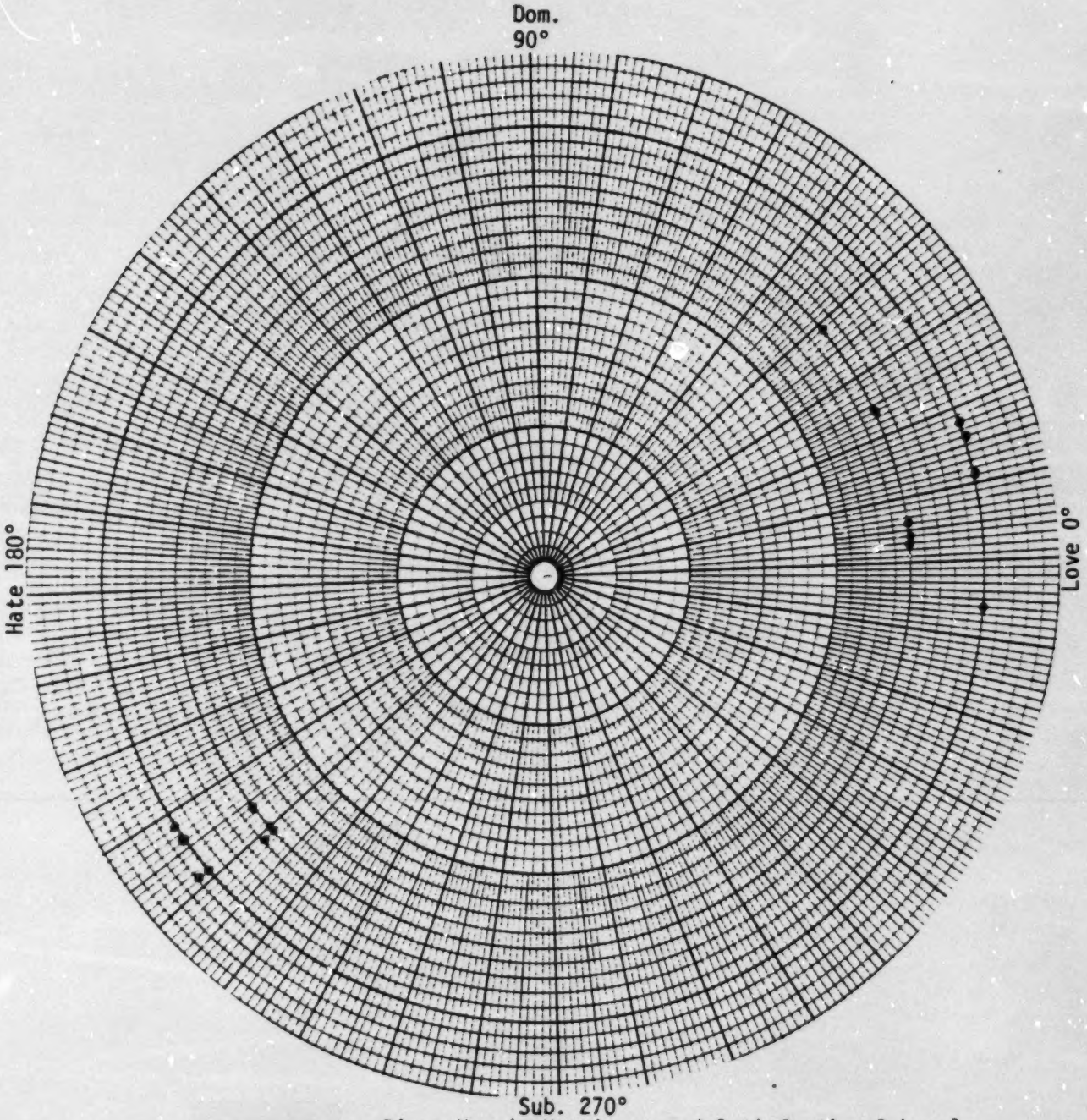
Piers-Harris Inventory

Male - Outer Circle
Female - Inner Circle



Tennessee Inventory

Male - Outer Circle
Female - Inner Circle



Piers-Harris Happiness and Satisfaction Subscale

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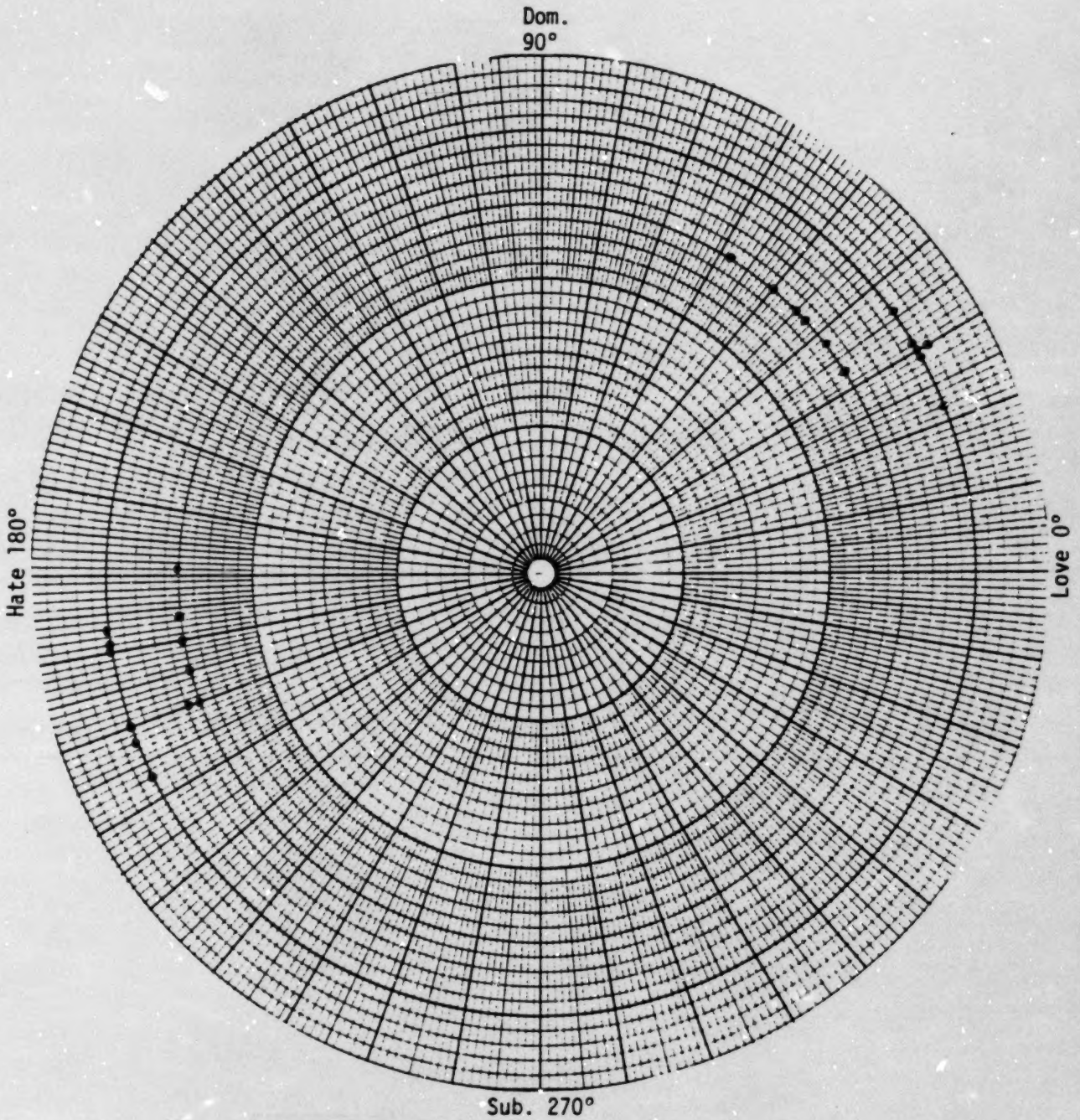
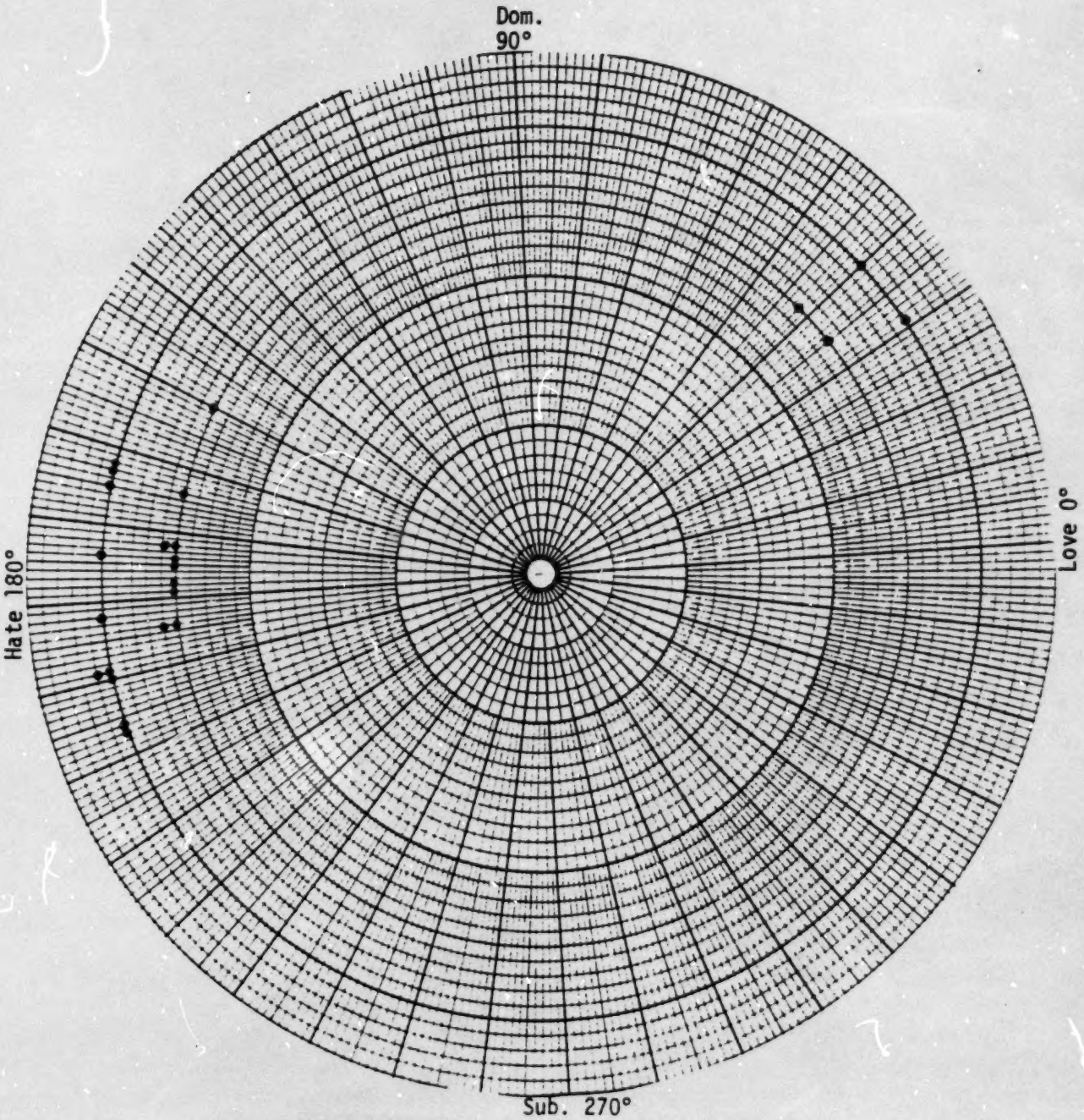
Female - Inner Circle



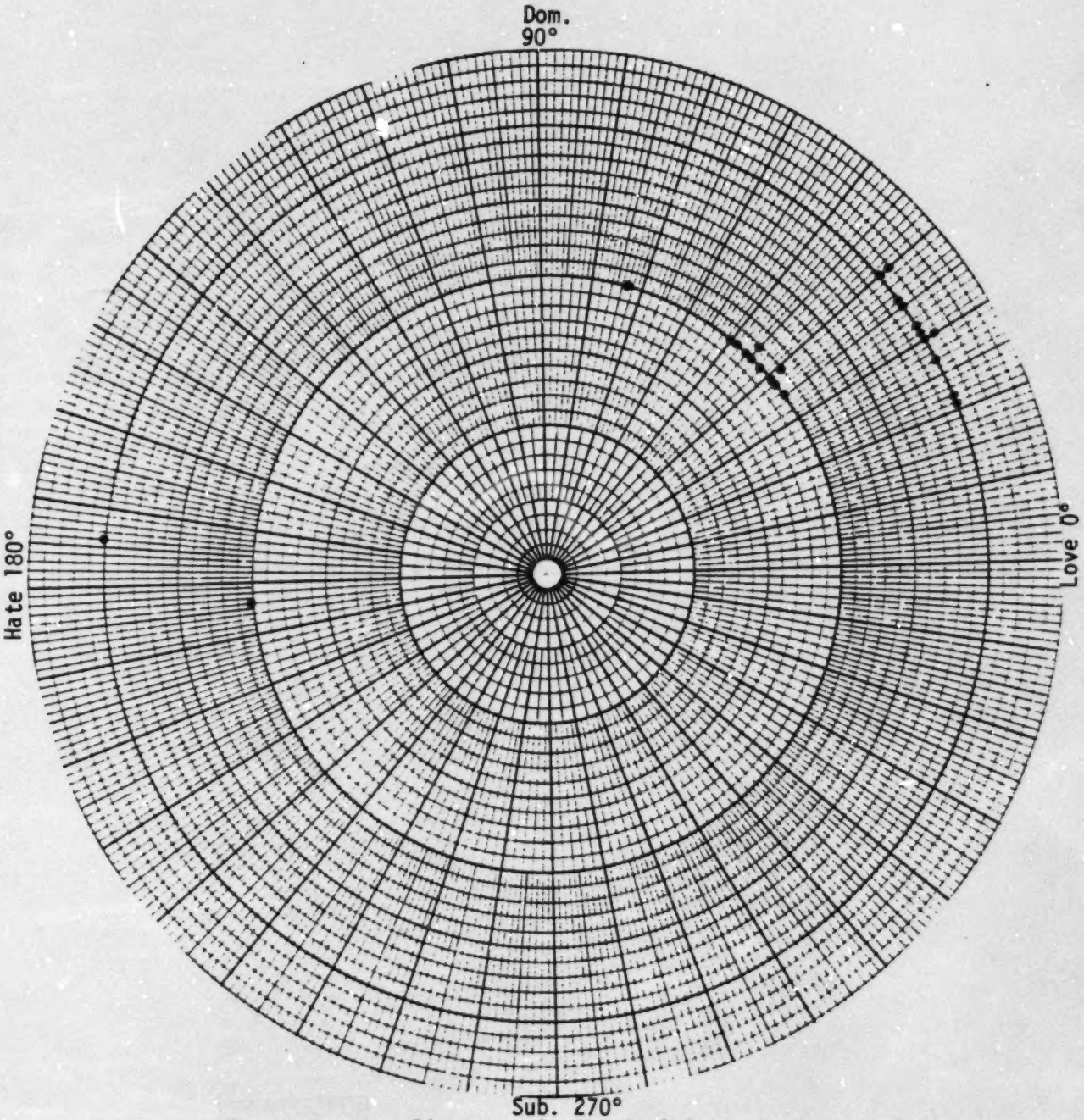
Piers-Harris Popularity Subscale

Male - Outer Circle
Female - Inner Circle



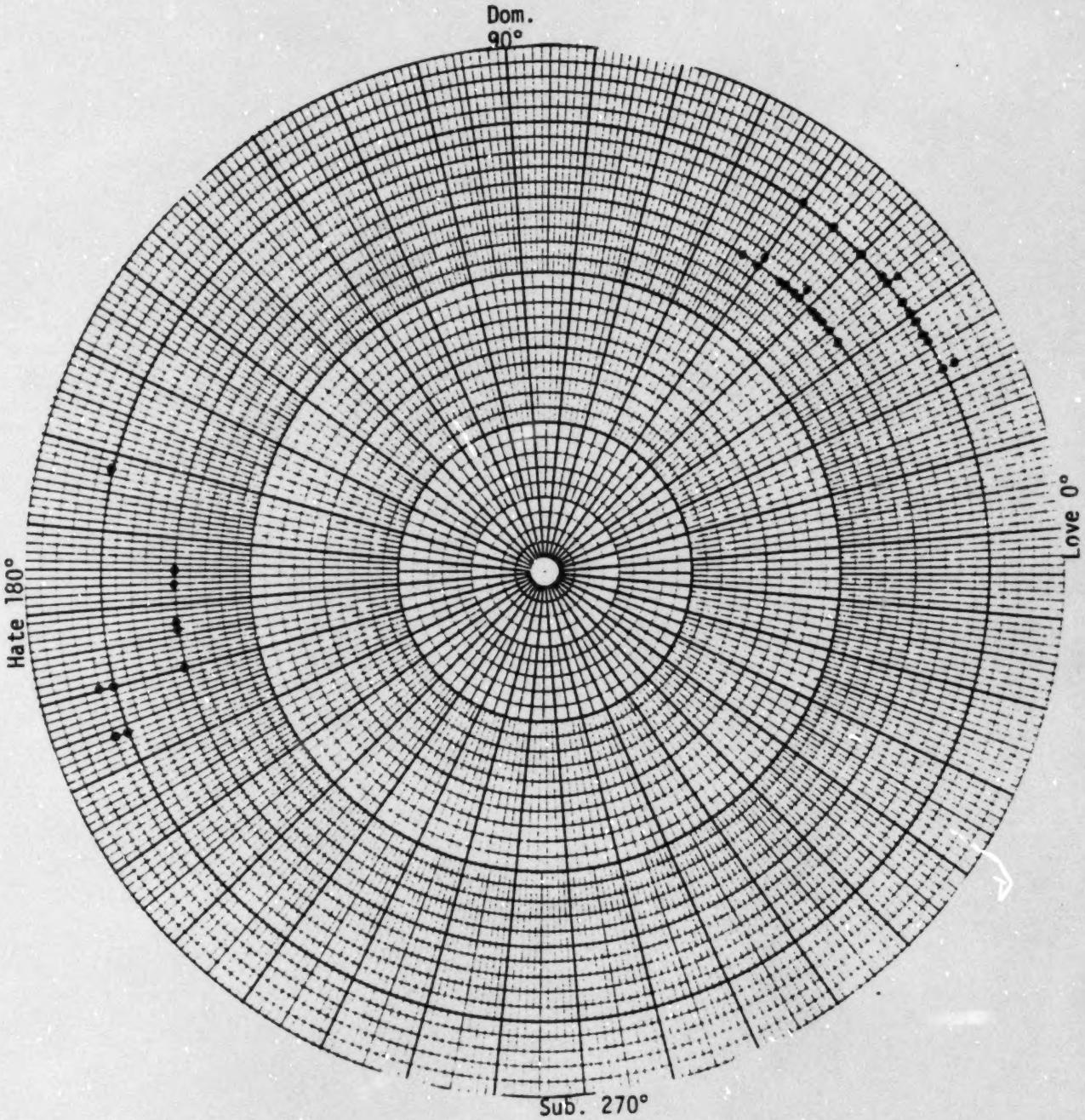
Piers-Harris Anxiety Subscale

Male - Outer Circle
Female - Inner Circle



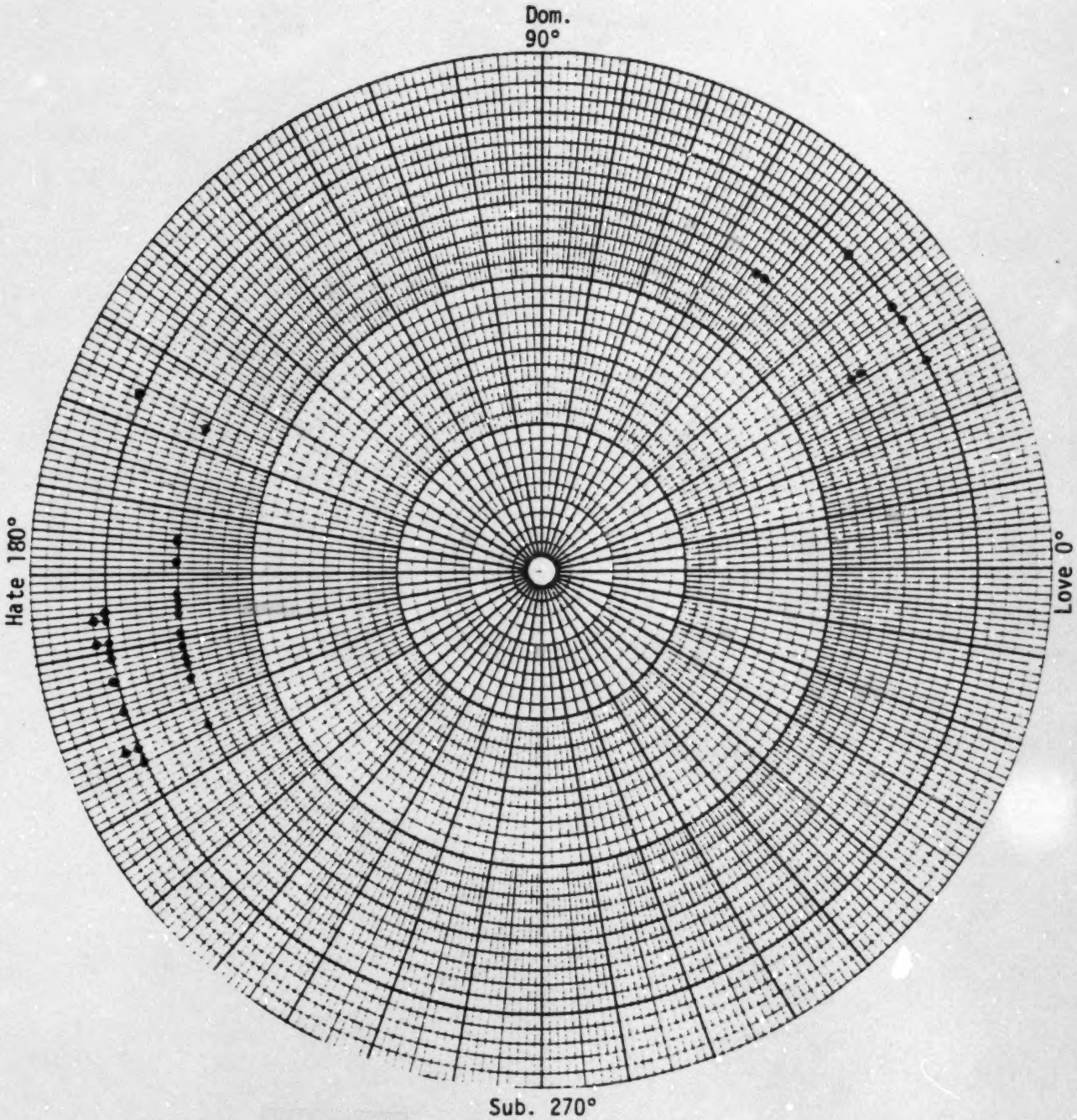
Piers-Harris Physical Appearance Subscale

Male - Outer Circle
Female - Inner Circle



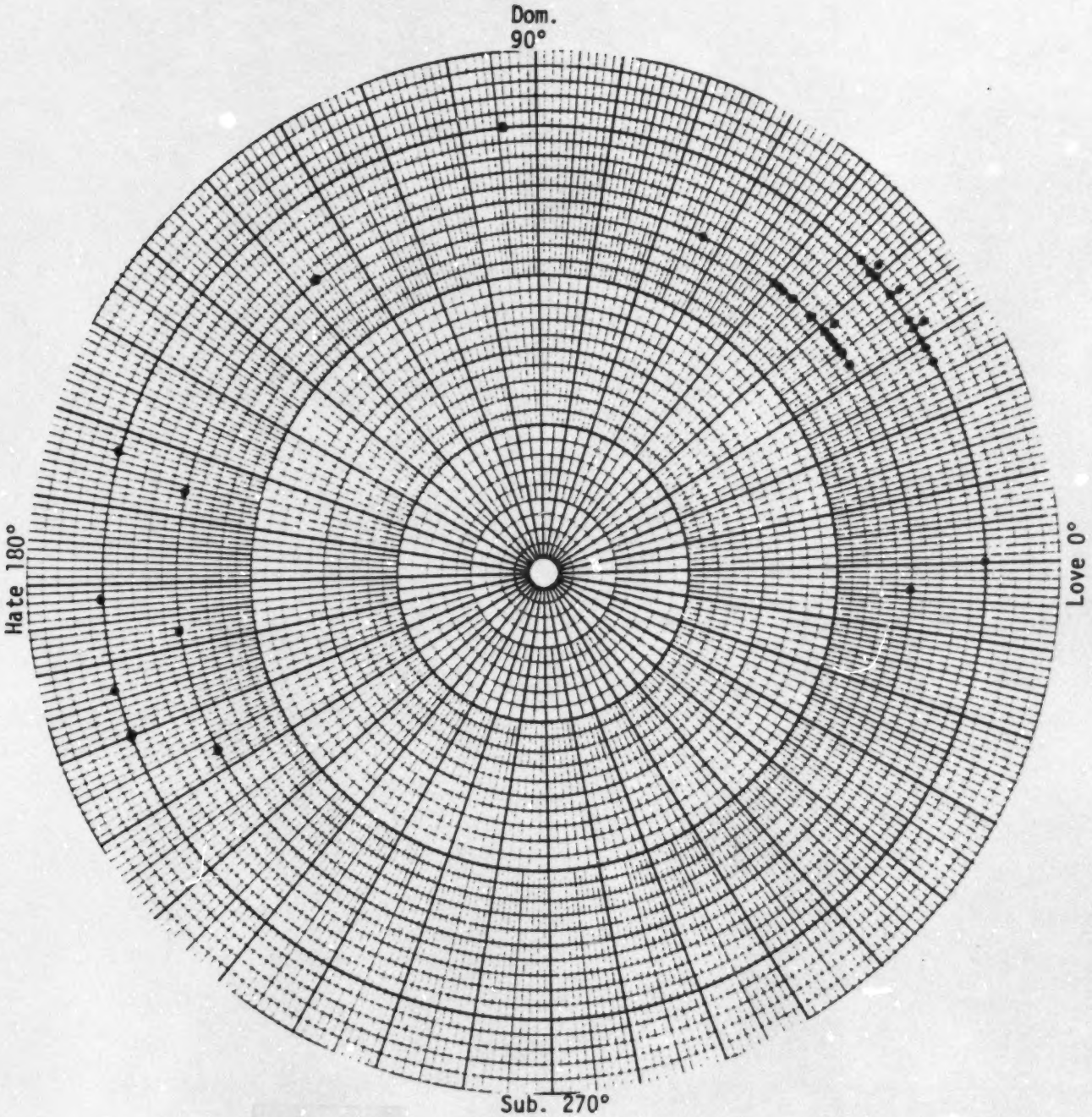
Piers-Harris Intellectual and School Status Subscale

Male - Outer Circle
Female - Inner Circle



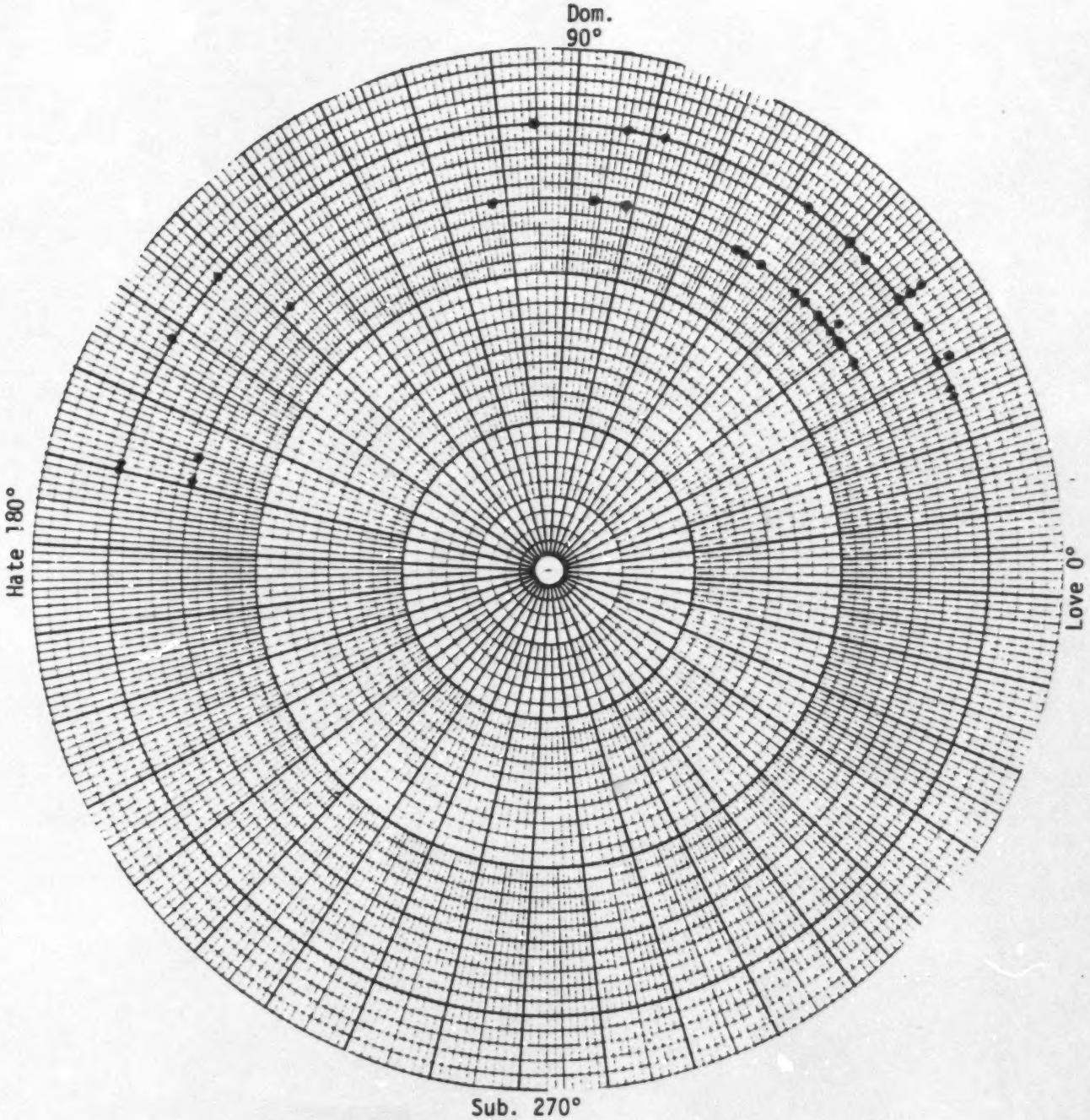
Piers-Harris Behavior Subscale

Male - Outer Circle
Female - Inner Circle



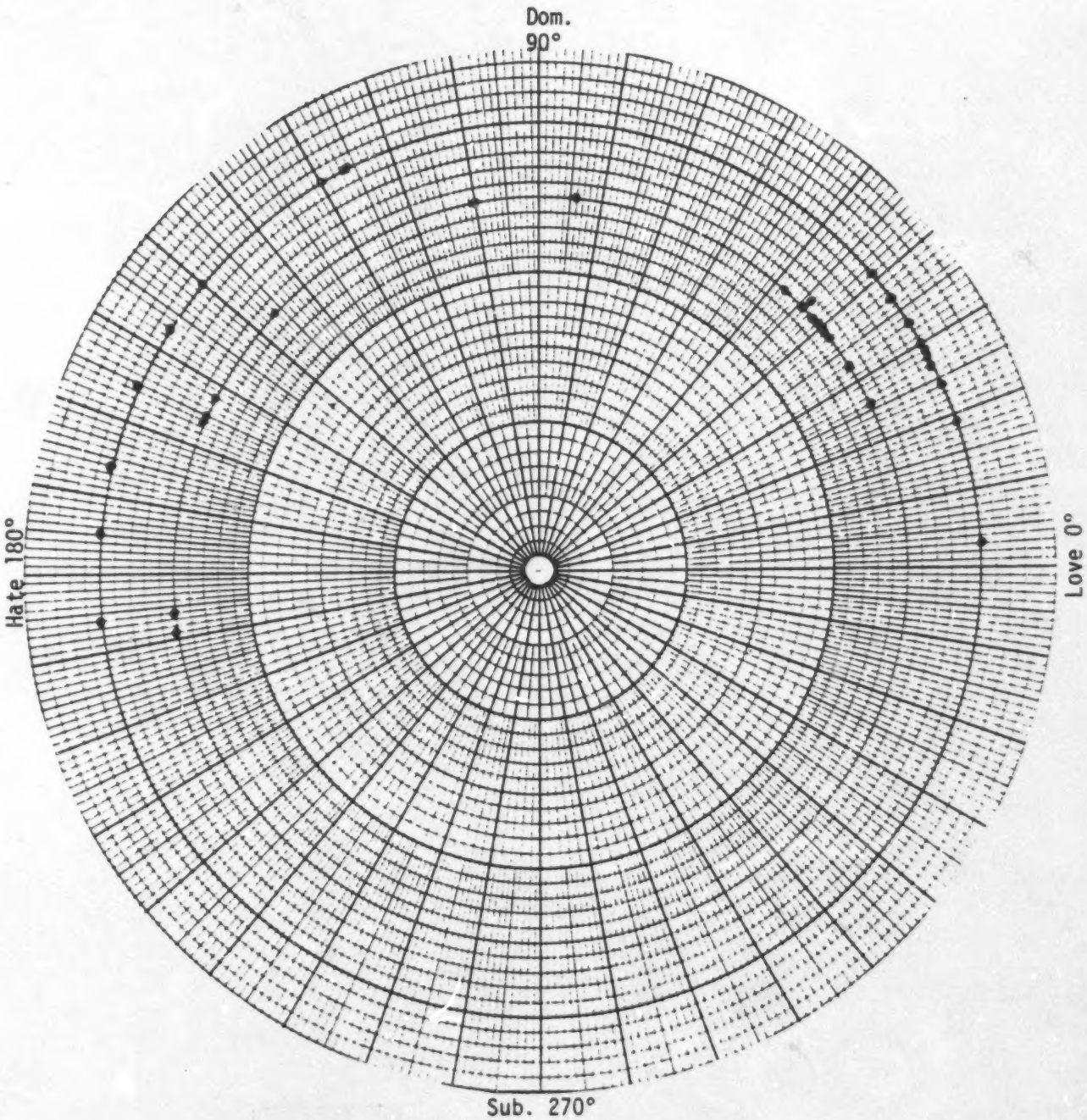
Tennessee Personal Self Subscale

Male - Outer Circle
Female - Inner Circle



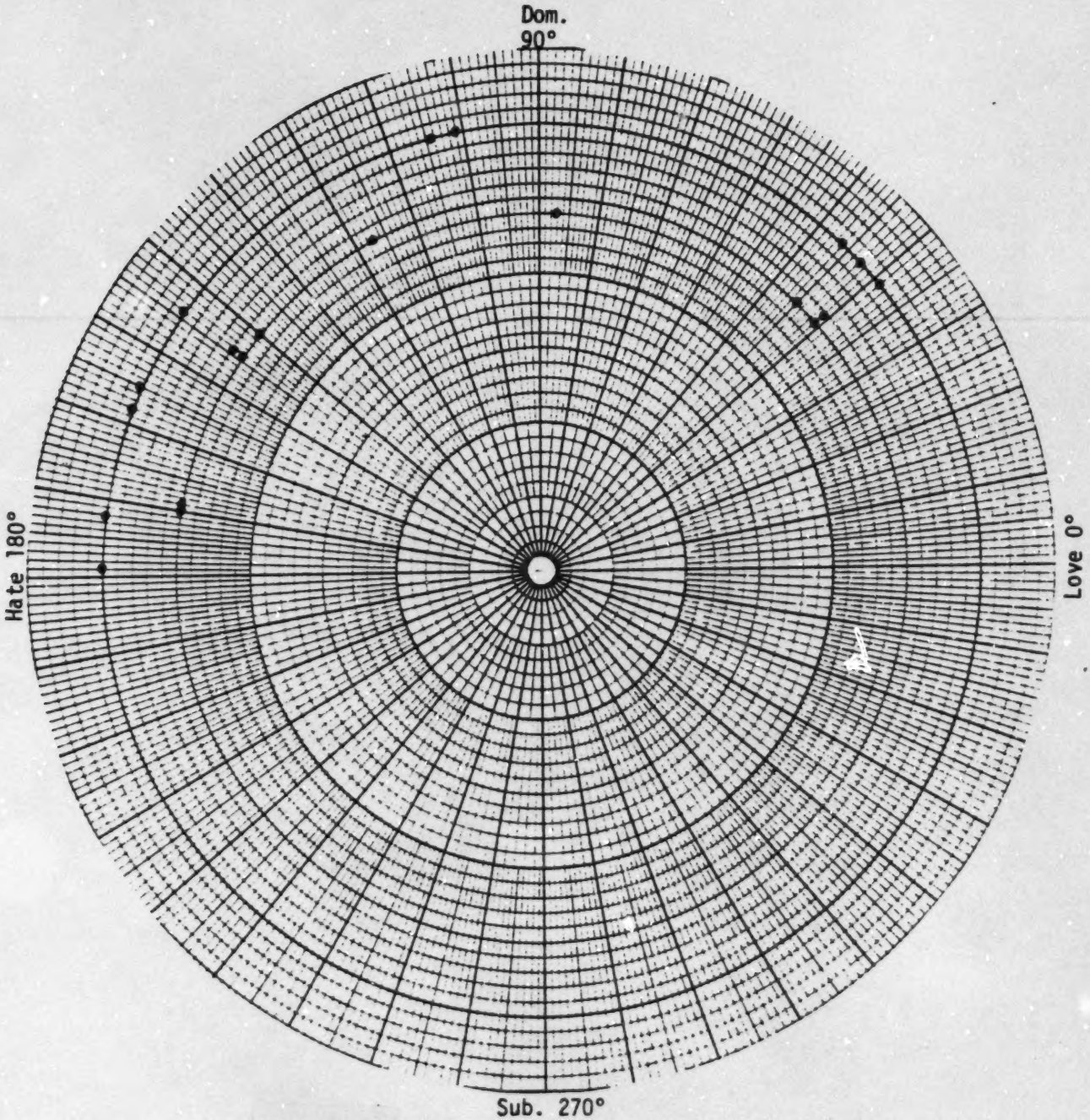
Tennessee Family Self Subscale

Male - Outer Circle
Female - Inner Circle



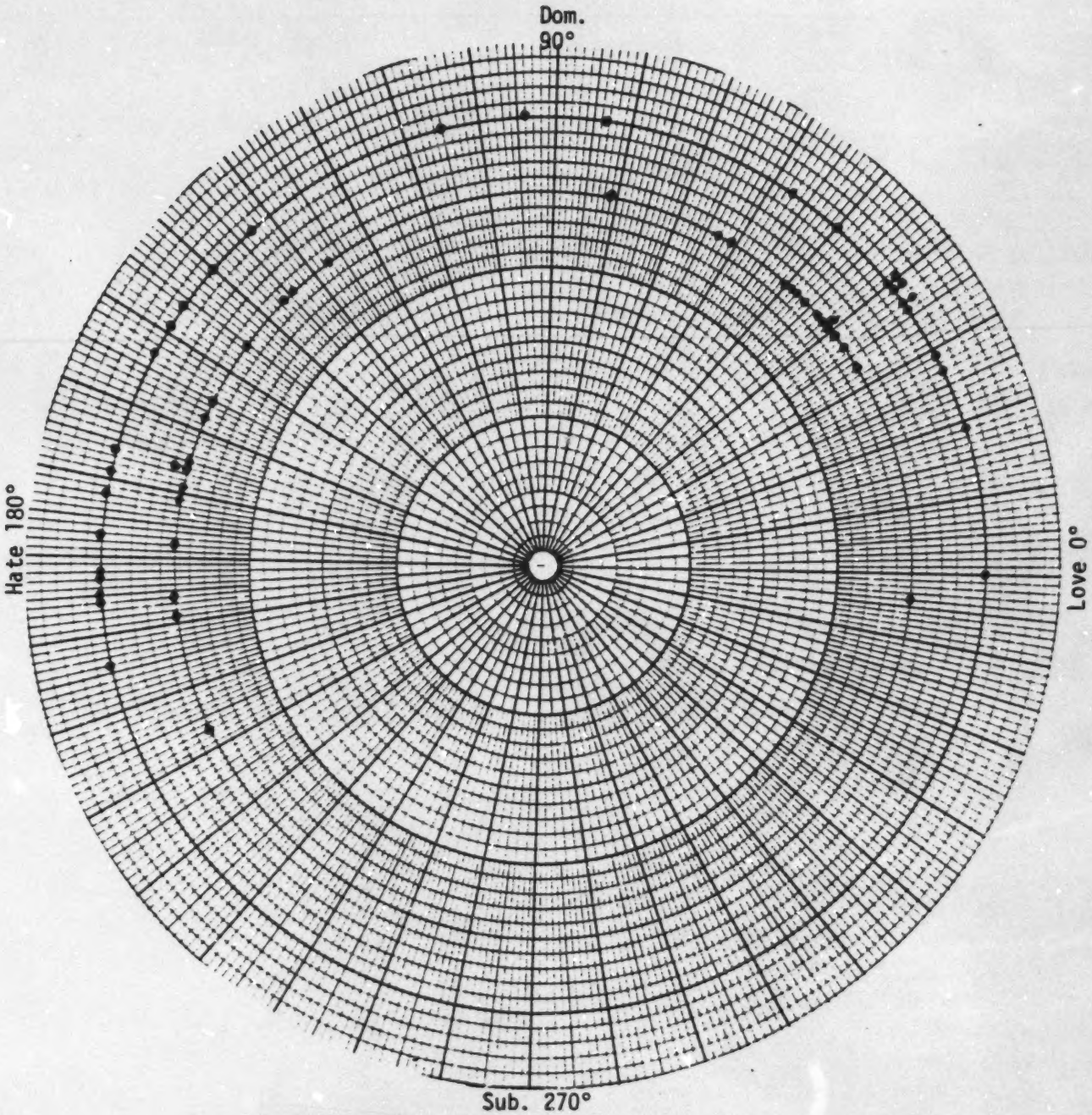
Tennessee Social Self Subscale

Male - Outer Circle
Female - Inner Circle



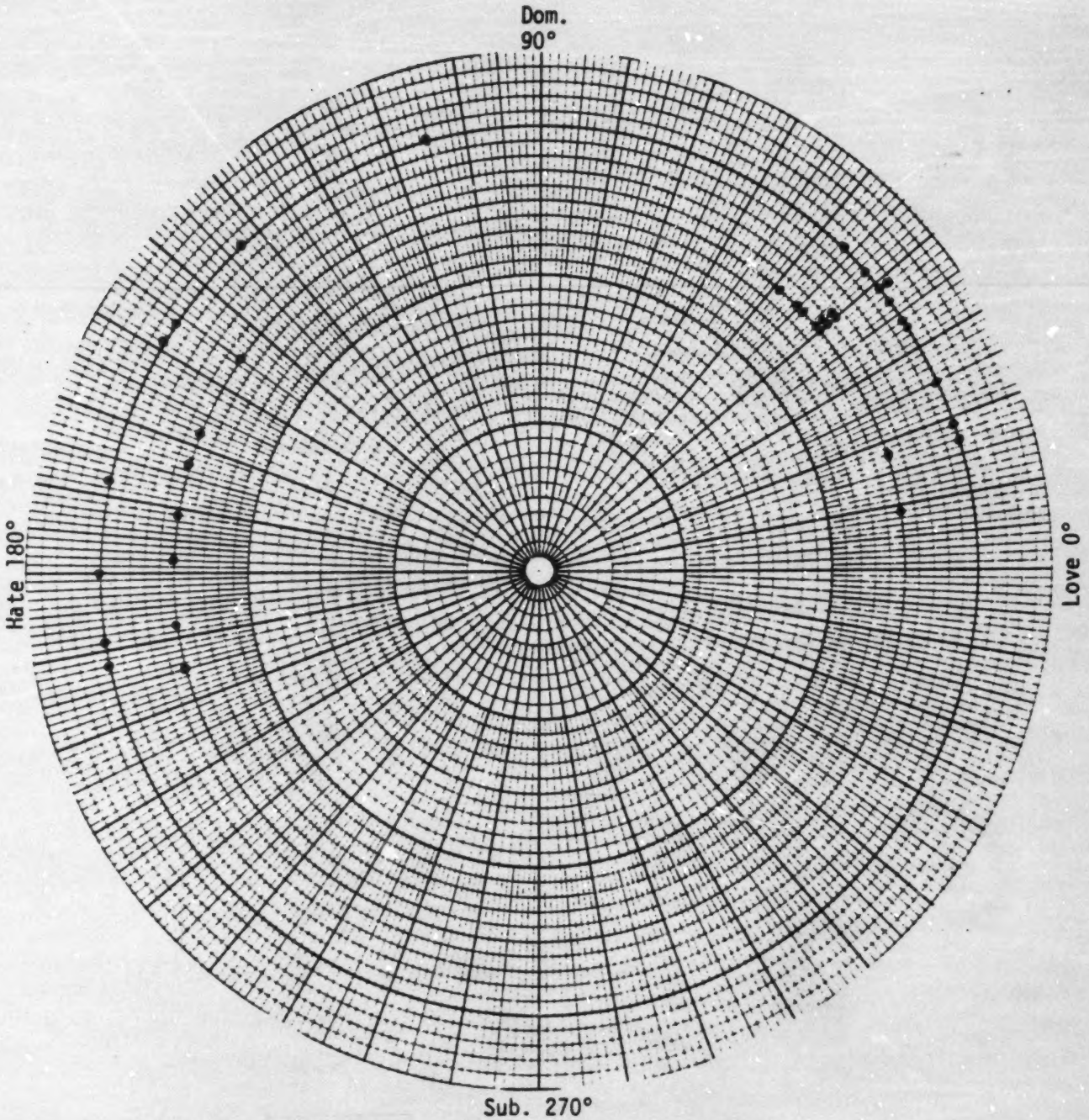
Tennessee Self Criticism Subscale

Male - Outer Circle
Female - Inner Circle



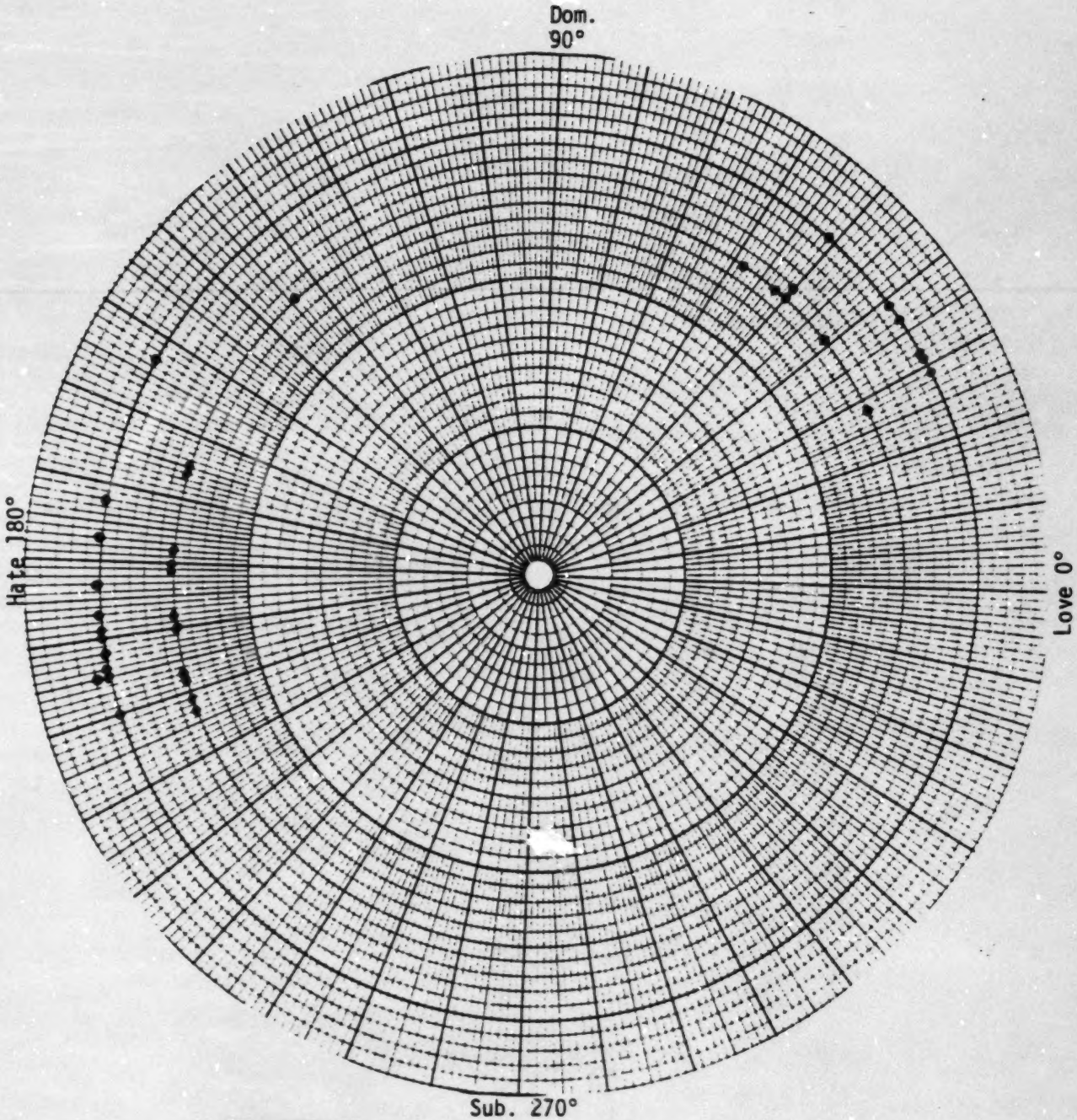
Tennessee Behavior Subscale

Male - Outer Circle
Female - Inner Circle



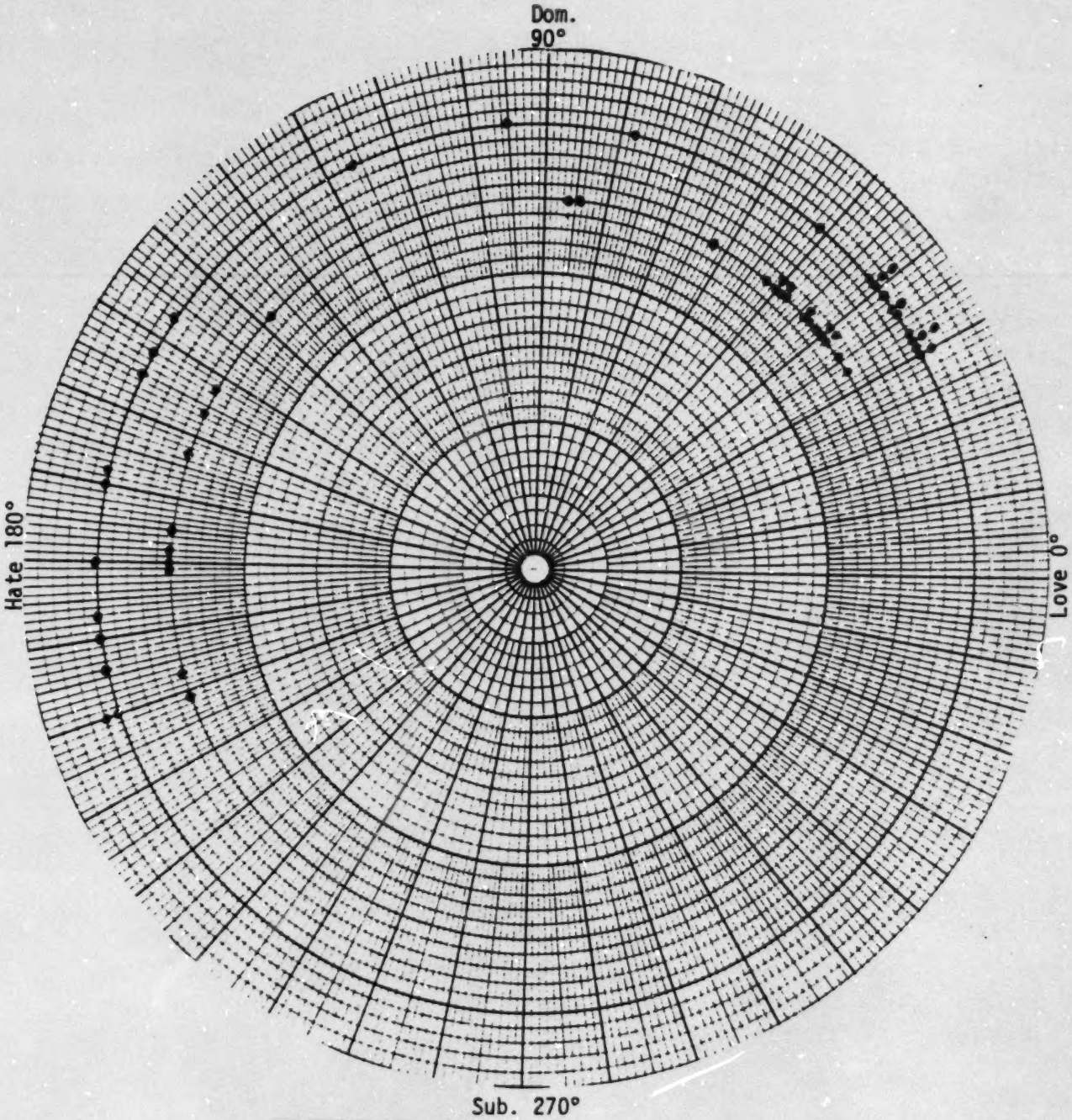
Tennessee Physical Subscale

Male - Outer Circle
Female - Inner Circle



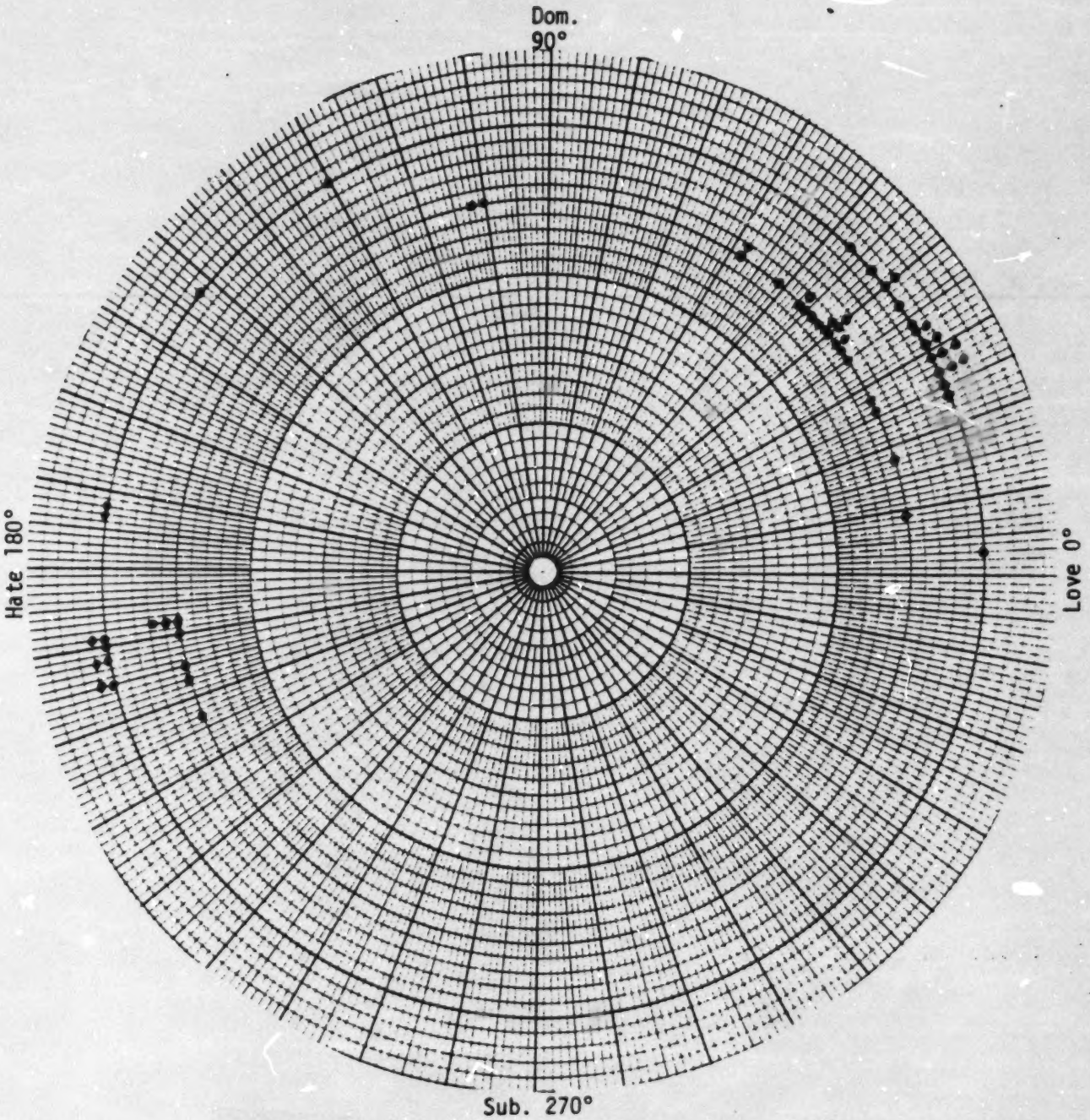
Tennessee Moral-Ethical Subscale

Male - Outer Circle
Female - Inner Circle



Tennessee Identity Subscale

Male - Outer Circle
Female - Inner Circle



Tennessee Self Satisfaction Subscale

Male - Outer Circle
Female - Inner Circle

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